

**WEARABLE INHALATION FILTER**

By

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**BACKGROUND OF THE INVENTION**

The present invention relates to a wearable inhalation filter. More particularly, the invention relates to a wearable inhalation filter that can be inserted into the nostrils and filters or captures materials that may be harmful or cause allergy to human beings.

Many people suffer from inhalation difficulties due to allergy or asthma, etc. A nose ring has been used to widen nostrils to alleviate the inhalation problems. Active functions of the nose ring including filtering or capturing potentially harmful materials are desirable so that such materials should not enter into a human body.

**SUMMARY OF THE INVENTION**

20 An object of the invention is to provide a wearable inhalation filter that can filter out harmful materials such as pollen or air pollution particles.

Another object of the invention is to provide a wearable inhalation filter that can capture or neutralize harmful materials such as germs.

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Still another object of the invention is to provide a wearable inhalation filter that can adjust its dimensions to accommodate various sizes of noses.

To achieve the above-described objects, the invention provides a wearable inhalation filter for a user to wear in her or his nostrils. The filter includes two nose rings that are inserted into the nostrils, and a bridge that connects the nose rings. Each of the nose rings includes a filter assembly for filtering air being inhaled, and the length of the bridge between the two nose rings is adjustable.

The filter assembly includes a filter web, and the filter web includes a physical filter layer having a plurality of pores. The filter web may have a corrugated shape to increase filtering area. Preferably, the size of the pores is in a range from about 4  $\mu$  to about 25  $\mu$ . More preferably, the size is about 10  $\mu$ .

The filter web may protrude out of the nose ring to increase filtering area thereby easing breathing.

The filter webs for the two nose rings may be integrated into a single filter web to further increase filtering area.

The filter web may be provided in a form to wrap around the nose rings and the bridge.

The filter web may further include a chemical filter layer having active carbon.

The filter assembly further includes a filter ring that holds the filter web. The filter ring is detachably  
5 attached to the nose ring. The filter ring is received in a circular groove provided on the nose ring.

The filter assembly further includes one or more mesh layers that are adjacent to the filter web. The mesh layers are plated with silver.

10 The bridge has two end connectors and a bridge body between the two end connectors. The end connector connects the bridge body to the nose ring. The end connector is rotatably attached to the nose ring. The end connector can adjust its length between the nose ring and  
15 the bridge body. The end connector includes a plurality of circular teeth along the length of the connector, and the nose ring includes a hole and the hole includes a circular projection. Two adjacent circular teeth of the end connector engage with the circular projection of the  
20 nose ring.

The length of the bridge body is adjustable. The bridge body includes a first bar and a second bar, and the second bar includes a slide hole into which the first bar can slide. The first bar includes a length adjusting  
25 projection, and the slide hole includes a plurality of

length adjusting holes. The length adjusting projection engages with one of the length adjusting holes.

The nose ring is made of flexible material including silicone. The nose ring further includes a plurality of  
5 breath holes.

The filter may further include two holding members that partially surround the nose rings.

The present invention is an improvement over the inventor's US Patent No. 6,572,634. In addition to the  
10 functions of '634, the present invention helps to prevent nasal allergies.

The advantages of the present invention are numerous in that: (1) allergic or unhealthy particles, such as pollen, hair of pets, fine dust and ticks, that exist in  
15 the air being inhaled cannot get into inside of the nose; (2) the filter can be worn suitably and comfortably by the dimensional adjustability and flexibility; (3) the filter provides sterilization effect in addition to physical filtering effects; (4) the filter can be  
20 economically produced; and (5) the filter is provided in a compact size.

Although the present invention is briefly summarized, the fuller understanding of the invention can be obtained by the following drawings, detailed description and  
25 appended claims.

**BRIEF DESCRIPTION OF THE DRAWINGS**

These and other features, aspects and advantages of the present invention will become better understood with  
5 reference to the accompanying drawings, wherein:

FIG. 1 is an illustrative perspective view showing a wearable inhalation filter according to the present invention is placed in the nostrils of a user;

FIG. 2 is an illustrative perspective view showing  
10 the wearable inhalation filter;

FIG. 3 is a cross-sectional view of a nose ring;

FIG. 4 is a front elevation view of a filter assembly;

FIG. 5 is a cross-sectional view taken along the  
15 line 5-5 in FIG. 4;

FIG. 6 is a view similar to FIG. 5 but with a different filter web;

FIG. 7 is a view similar to FIG. 5 but with another different filter web;

FIG. 8 is a view similar to FIG. 3 but with the  
20 filter assembly that occupies the whole available space in the nose ring;

FIG. 9 is a side elevation view showing the nose rings and a bridge;

FIG. 10 is a cross-sectional view taken along the line 10-10 in FIG. 9;

FIG. 11 is an enlarged cross-sectional view of the circle A in FIG. 9;

5        FIG. 12 is a view similar to FIG. 11 but shows different engaging parts;

FIG. 13 is an elevation view of the wearable inhalation filter showing filter assemblies that protrude outside of the nose rings;

10       FIG. 14 is an enlarged cross-sectional view of the circle B in FIG. 13;

FIG. 15 is a view similar to FIG. 13 but shows that a single filter assembly is provided for the nose rings;

15       FIG. 16 is an enlarged cross-sectional view of the circle C in FIG. 15; and

FIG. 17 is a view similar to FIG. 15 but shows that a single filter assembly encloses the nose rings and the bridge.

20       **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

FIGS. 1 and 2 show a wearable inhalation filter 10 according to the present invention. The wearable inhalation filter 10 includes two nose rings 12 that are inserted into the nostrils of a user, and a bridge 14  
25    that connects the nose rings 12. Each of the nose rings

12 includes a filter assembly 16 for filtering air being inhaled (Refer to FIG. 3). The length of the bridge 14 between the two nose rings 12, that is, the distance between the two nose rings 12 when the wearable  
5 inhalation filter 10 is worn by a user, is adjustable.

FIG. 3 shows the filter assembly 16 attached to the nose ring 12. FIGS. 4-8 show the filter assembly 16. As shown in FIG. 5, the filter assembly 16 includes a filter web 18. The filter web 18 includes a physical filter  
10 layer 20 that includes a plurality of pores. Preferably, the size of the pores is in a range from about  $4\mu$  to about  $25\mu$ . More preferably, the size of the pores is about ten  $10\mu$  ( $10000\text{ nm}$ ). Since the size of pollen is about  $5\mu$  ( $5000\text{ nm}$ )~  $100\mu$ , the physical filter layer 20  
15 can block pollen, other particles or tiny mites from entering into the nose.

The filter web 18 further includes a chemical filter layer 22. The chemical filter layer 22 includes active carbon thereby sterilizing or neutralizing potentially  
20 harmful materials such as germs.

The filter assembly 16 further includes a filter ring 24. The filter ring 24 holds the filter web 18. The filter ring 24 is detachably attached to the nose ring 12. As shown in FIG. 3, the filter ring 24 is received in a  
25 circular groove 26 provided on the nose ring 12. The

filter assembly **16** may further include one or more mesh layers **28** that are adjacent to the filter web **18** as shown in FIGS. 6, 7 and 8. The mesh layers **28** support the filter web **18**. The mesh layers **28** are plated with silver to utilize anti-bacterial property of silver. FIG. 8 shows another filter ring **54** that utilizes substantially the whole width of the nose ring **12**. The filter assembly **54** is received in a circular groove **56** provided in the nose ring **12**. In this way, the thickness of the chemical filter layer **22** may be maximized to enhance filtering effect.

FIGS. 9-12 show the bridge **14**. The bridge **14** has two end connectors **30** and a bridge body **32** between the two end connectors **30**. The end connector **30** connects the bridge body **32** to the nose ring **12**.

The end connector **30** is rotatably attached to the nose ring **12**. The end connector **30** can adjust its length between the nose ring **12** and the bridge body **32**. As shown in FIG. 11, the end connector **30** includes a plurality of circular teeth **34** along the length of the end connector **30**. The nose ring **12** includes a hole **36** and the hole **36** includes a circular projection **38**. Two adjacent circular teeth **34** engage with the circular projection **38**. The end connector **30** can rotate within the hole **36** with the circular teeth **34** slidingly rotate with respect to the



circular projection **38**. The nose ring **12** and the end connector **30** are made of flexible materials, so that different circular teeth **34** may engage with the circular projection **38** as the end connector **30** is moved by a user  
5 further into or out of the hole **36**. FIG. 12 shows bigger and rounded circular teeth **58** and a rounded circular projection **60**.

The length of the bridge body **32** is adjustable. The bridge body **32** includes a first bar **40** and a second bar  
10 **42**. The second bar **42** includes a slide hole **44** into which the first bar **40** can slide.

As shown in FIG. 10, the first bar **40** includes a length adjusting projection **46**. The slide hole **44** of the second bar **42** includes a plurality of length adjusting  
15 hole **48** arranged along the length of the slide hole **44**, and thus the second bar **42**. The length adjusting projection **46** engages with one of the length adjusting holes **48** as the first bar **40** moves back and forth in the slide hole **44**.

20 Therefore, relative position of the two nose rings **12** with each other can be adequately adjusted by the adjustable end connectors **30** and bridge body **32**. Thus, the wearable inhalation filter **10** may be easily adapted to individual variations of nostrils' positions.

The nose ring **12** is made of flexible material including silicone. Thus, the nose ring **12** is comfortably fitted into a nostril due to its light weight and flexibility.

5       The nose ring **12** further includes a plurality of breath holes **50** as shown in FIG. 2. The breath holes **50** are arranged along the periphery of the nose ring **12**. The breath holes **50** provide contact with air for portions of the nostril wall covered by the breath holes **50**.  
10       Corresponding holes (not shown) may be provided on the filter ring **54**.

      The wearable inhalation filter **10** further comprises two holding members **52** as shown in FIG. 2. The holding member **52** partially surrounds the nose ring **12**. The  
15       holding member **52** provides enforcement for the nose ring **12**.

      FIGS. 13 ~ 17 show different embodiments of the filters. FIG. 13 shows that a filter web **62** protrudes out of the nose ring. In this way, the filter web **62**  
20       increases filtering area. Then finer pores may be used for a normal inhaling pressure of the human body.

      FIG. 14 shows that the filter web **62** has a corrugated shape to further increase the filtering area.

      FIG. 15 shows that a single, integrated filter web  
25       **64** is provided for both of the nose rings **12**. In this way,

the filtering are is further increased, and the wearable inhalation filter can be produced more economically.

FIG. 16 shows how the filter web **64** is attached to the nose rings **12**. A filter ring **68** is fixed to the filter web **64**. The filter web **64** together with the filter ring **68** is detachably attached to the nose ring **12** by inserting the filter ring **68** into the nose ring **12**.

FIG. 17 shows that a filter web **66** wraps around the nose rings **12** and the bridge **14**. The wearable inhalation filter may be provided as a unit that includes the nose rings assembled with the bridge, and a filter web patch. After adjusting the bridge, the user simply wraps around the nose rings with the patch and wears the inhalation filter. The filter web is disposable separately from the nose rings and the bridge. The filter web may be made of non-woven cloth or fabric that has fine pores. Existing air cleaning filters that are used for air conditioners, etc. may also be used to make the filter web.

With the above construction, the wearable inhalation filter can actively remove harmful materials from inhalation air both physically and chemically. The wearable inhalation filter can be comfortably and conveniently worn by the dimensional adaptability of the bridge.

Although the invention has been described in  
considerable detail, other versions are possible by  
converting the aforementioned construction. Therefore,  
the scope of the invention shall not be limited by the  
5 specification specified above.